CLAIMS

1. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads each having a mounted surface exposed to a peripheral portion of a rear surface of said sealing portion, and a sealing-portion forming surface disposed on an opposite side to the mounted surface and contacting with a side surface of said sealing portion; and

a plurality of wires for connecting surface electrodes of said semiconductor chip and said leads corresponding thereto,

wherein a length between inner ends of said sealing-portion forming surfaces of said leads disposed to oppose to each other is longer than a length between inner ends of said mounted surfaces.

2. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads each having a mounted surface exposed to a peripheral portion of a rear surface of said sealing portion, and a sealing-portion forming surface disposed on an opposite side to the mounted surface and

contacting with a side surface of said sealing portion; and

a plurality of wires for connecting surface electrodes of said semiconductor chip and said leads corresponding thereto,

wherein a length between inner ends of said sealing-portion forming surfaces of said leads disposed to oppose to each other is longer than a length between inner ends of said mounted surfaces, and a notch portion is formed in the inner end of said sealing-portion forming surface.

3. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads each having a mounted surface exposed to a peripheral portion of a rear surface of said sealing portion, and a sealing-portion forming surface disposed on an opposite side to the mounted surface and contacting with a side surface of said sealing portion; and

a plurality of wires for connecting surface electrodes of said semiconductor chip and said leads corresponding thereto,

wherein a length between inner ends of said sealing-portion forming surfaces of said leads disposed to oppose to each other is longer than a length between inner ends of said mounted surfaces, and at least one portion of said sealing-portion forming surface is larger in width than

said mounted surface.

4. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads each having a mounted surface exposed to a peripheral portion of a rear surface of said sealing portion, and a sealing-portion forming surface disposed on an opposite side to the mounted surface and contacting with a side surface of said sealing portion; and

a plurality of wires for connecting surface electrodes of said semiconductor chip and said leads corresponding thereto,

wherein a length between inner ends of said sealing-portion forming surfaces of said leads disposed to oppose to each other is longer than a length between inner ends of said mounted surfaces, a notch portion is formed in the inner end of said sealing-portion forming surface, and at least one portion of said sealing-portion forming surface is larger in width than said mounted surface.

5. A method of manufacturing a semiconductor device, comprising the steps of:

preparing a lead frame having a tab capable of supporting a semiconductor chip and a plurality of leads disposed around said tab, wherein a length between inner

ends of sealing-portion forming surfaces of said leads disposed to oppose to each other is larger than a length between inner ends of mounted faces located on an opposite side thereto;

disposing said semiconductor chip within a region surrounded by an inner end of said sealing-portion forming surface of each of said plurality of leads, and thereafter mounting said semiconductor chip on said tab;

connecting surface electrodes of said semiconductor chip and said leads corresponding thereto by wires;

resin-sealing said semiconductor chip and said wire, and forming a sealing portion that the mounted surfaces of said plurality of leads are exposed to and arranged on a peripheral portion of a rear surface; and

cutting each of said leads and separating it from said lead frame.

6. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads each having a mounted surface exposed to a peripheral portion of a rear surface of said sealing portion, and a sealing-portion forming surface disposed on an opposite side to the mounted surface and contacting with a side surface of said sealing portion; and

a plurality of wires for connecting surface

electrodes of said semiconductor chip and said leads corresponding thereto,

wherein each of said leads is formed so that a length between inner ends of said sealing-portion forming surfaces of said leads disposed to oppose to each other is longer than a length between inner ends of said mounted surfaces, and each of said leads has said sealing-portion forming surface wider than said mounted surface.

7. The semiconductor device according to claim 6 wherein said lead comprises a wire bonding portion disposed on a chip side and a base portion sandwiched between an inside and an outside of a side surface of said sealing portion, and said sealing-portion forming surface in said wire bonding portion is larger in width than said sealing-portion forming surface of said based portion.

8. The semiconductor device according to claim 6 wherein a concave portion is formed in said sealing-portion forming surface of said lead.

9. The semiconductor device according to claim 8 wherein said concave portion is formed outside a wire bonding place of said sealing-portion forming surface.

10. The semiconductor device according to claim 6 wherein a concave portion, which is smaller in width

than said sealing-portion forming surface with respect to a direction perpendicular to an extending direction of said lead, is formed in said sealing-portion forming surface of said lead.

11. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads each having a mounted surface exposed to a peripheral portion of a rear surface of said sealing portion, and a sealing-portion forming surface disposed on an opposite side to the mounted surface and contacting with a side surface of said sealing portion; and

a plurality of wires for connecting surface electrodes of said semiconductor chip and said leads corresponding thereto,

wherein a length between inner ends of said sealing-portion forming surfaces of said leads disposed to oppose to each other is longer than a length between inner ends of said mounted surfaces,

said tab is formed to be smaller than a main surface of said semiconductor chip, and

a portion of said sealing portion is disposed on a side of a rear surface which is an opposite surface to a chip mounting side of said tab.

12. The semiconductor device according to claim 11 wherein a surface of the chip mounting side of said tab is disposed on the same height as that of said sealing-portion forming surface of said lead.

13. The semiconductor device according to claim 12 wherein portions of said tab and a hanging lead for supporting the tab are formed thin by a half etching process.

14. The semiconductor device according to claim 11 wherein the surface of the chip mounting side of said tab is disposed at a position more apart from a direction of a main surface side of said semiconductor chip than said sealing-portion forming surface of said lead.

15. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads each having a mounted surface exposed to a peripheral portion of a rear surface of said sealing portion, and a sealing-portion forming surface disposed on an opposite side to the mounted surface and contacting with a side surface of said sealing portion; and

a plurality of wires for connecting surface electrodes of said semiconductor chip and said leads

corresponding thereto,

wherein a length between inner ends of said sealing-portion forming surfaces of said leads disposed to oppose to each other is longer than a length between inner ends of said mounted surfaces,

said tab is formed to be smaller than a main surface of said semiconductor chip, and

a portion of said sealing portion is disposed on a side of a rear surface which is an opposite surface to a chip mounting side of said tab, and a length projecting from an end portion of said tab of said semiconductor chip is shorter than a length directed to a lead-extending direction of said mounted surface of said lead.

16. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads, each portion of which is exposed to an end portion of a rear surface of said sealing portion;

a hanging lead connected to said tab and having a mounted surface exposed to the rear surface of said sealing portion; and

a plurality of conductive wires for connecting surface electrodes of said semiconductor chip and said leads corresponding thereto,

wherein the conductive wires, whose one ends are connected to the surface electrodes of said semiconductor chip, are such that the other ends thereof are connected to a region opposing to said mounted surface of an opposite surface to said mounted surface of said hanging lead.

17. The semiconductor device according to claim 16 wherein a concave portion is formed in the opposite surface to said mounted surface of said hanging lead.

18. The semiconductor device according to claim 17 wherein said concave portion in said hanging lead is formed outside a position to which said wire in the opposite surface of said mounted surface is connected.

19. The semiconductor device according to claim 18 wherein said concave portion in said hanging lead is formed inside a position to which said wire in the opposite surface of said mounted surface is connected.

20. The semiconductor device according to claim 16 wherein a projecting portion is provided to both side surfaces outside a position to which said wire of said hanging lead is connected.

21. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads, each portion of which is exposed to a peripheral portion of a rear surface of said sealing portion;

a hanging lead connected to said tab and having a mounted surface exposed to a chamfered portion of the rear surface of said sealing portion; and

a plurality of conductive wires for connecting surface electrodes of said semiconductor chip and said leads corresponding thereto,

wherein the conductive wires, whose one ends are connected to an electrode for GND among the surface electrodes of said semiconductor chip, are such that the other ends thereof are connected to a region opposing to said mounted surface of an opposite surface to said mounted surface of said hanging lead.

22. The semiconductor device according to claim 21 wherein said tab is sealed by said sealing portion.

23. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads, each of which has a mounted surface exposed to a peripheral portion of a rear surface

of said sealing portion;

a hanging lead connected to said tab and having a mounted surface exposed to the rear surface of said sealing portion; and

a plurality of conductive wires for connecting surface electrodes of said semiconductor chip and said leads corresponding thereto,

wherein the conductive wires, whose one ends are connected to the surface electrodes of said semiconductor chip, are such that the other ends thereof are connected to a region opposing to said mounted surface of an opposite surface to said mounted surface of said hanging lead, and

a length of said mounted surface in an extending direction of said hanging lead is larger than a thickness of said hanging lead on said mounted surface.

24. The semiconductor device according to claim 23

wherein a shortest-distance portion between said leads adjacent to each other is sealed by said sealing portion in a region located inside said mounted surface of said hanging lead.

25. The semiconductor device according to claim 23

Wherein when said semiconductor device is mounted on a mounting substrate, a terminal of said mounting substrate connected to said lead adjacent to said hanging lead of said semiconductor device is disposed so that an inner end

thereof coincides planarly with or is outside the inner end of said mounted surface of said lead.

26. A semiconductor device comprising:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads, each of which has a mounted surface exposed to a peripheral portion of a rear surface of said sealing portion, and a sealing-portion forming surface disposed on an opposite side thereto and contacting with a side surface of said sealing portion;

a hanging lead connected to said tab and having a mounted surface exposed to the rear surface of said sealing portion; and

a plurality of conductive wires for connecting surface electrodes of said semiconductor chip and said leads corresponding thereto,

wherein said leads are formed so that a length between inner ends of said sealing-portion forming surfaces of said leads disposed to oppose to each other is larger than a length between inner ends of said mounted surfaces of said leads, and

the conductive wires, whose one ends are connected to the surface electrodes of said semiconductor chip, are such that the other ends thereof are connected to a region opposing to said mounted surface of an opposite surface to

said mounted surface of said hanging lead.

27. A method of manufacturing a semiconductor device, comprising the steps of:

preparing a lead frame having a plurality of device regions, each of which comprises a tab on which a semiconductor chip is mounted, a plurality of leads disposed around said tab and having mounted surfaces and sealing-portion forming surfaces composed of only flat surfaces located on opposite sides thereto, and a hanging lead supporting said tab, wherein the lead frame is formed so that a length between inner ends of said sealing-portion forming surfaces of said leads disposed so as to oppose to each other is larger than a length between inner ends of said mounted surfaces;

disposing said semiconductor chip within a region surrounded by an inner end of said sealing-portion forming surface of each of said plurality of leads, and thereafter mounting said semiconductor chip on said tab;

connecting surface electrodes of said semiconductor chip and said leads corresponding thereto by conductive wires;

performing resin molding with said plurality of device regions being covered with one cavity of a resin molding die, and forming a batch sealing portion so that the mounted surfaces of said plurality of leads are exposed to and arranged on a peripheral portion of a rear surface; and

clipping said sealing-portion forming surface and said mounted surface of each of said leads by a cutting die, cutting each of the leads and said batch sealing portion by dicing, and separating them from said lead frame.

28. A method of manufacturing a semiconductor device, comprising the steps of:

preparing a lead frame having a plurality of device regions, each of which comprises a tab on which a semiconductor chip is mounted, a plurality of leads disposed around said tab and having mounted surfaces and sealing-portion forming surfaces located on opposite sides thereto, and a hanging lead supporting said tab, wherein the lead frame is formed so that a length between inner ends of said sealing-portion forming surfaces of said leads disposed so as to oppose to each other is larger than a length between inner ends of said mounted surfaces and wherein a concave portion a smaller in width than said sealing-portion forming surface with respect to a direction perpendicular to an extending direction of said lead is formed;

disposing said semiconductor chip within a region surrounded by an inner end of said sealing-portion forming surface of each of said plurality of leads, and thereafter mounting said semiconductor chip on said tab;

connecting a surface electrode of said semiconductor chip and a portion located inside said concave portion in

said sealing-portion forming surface of said lead corresponding thereto by a conductive wire;

disposing a film on a die surface of a resin molding die, performing die clamping with said plurality of device regions being covered with one cavity of the resin molding die, making said mounted surface of said lead intrude into said film by said die clamping to perform resin molding, and thereby forming a batch sealing portion so that the mounted surfaces of said plurality of leads are exposed to and arranged on a peripheral portion of a rear surface; and

cutting each of the leads and said batch sealing portion by dicing, and separating them from said lead frame.

29. A method of manufacturing a semiconductor device, comprising the steps of:

preparing a lead frame having a tab on which a semiconductor chip is mounted, a plurality of leads disposed around said tab and having mounted surfaces and sealing-portion forming surfaces located on opposite sides thereto, and a hanging lead supporting said tab, wherein the lead frame is formed sot that a length between inner ends of said sealing-portion forming surfaces of said leads disposed so as to oppose to each other is larger than a length between inner ends of said mounted surfaces, and a stress relaxing means for relaxing a stress occurring at a time of cutting is provide to each of said leads;

disposing said semiconductor chip within a region

32. A method of manufacturing a semiconductor device including:

a tab on which a semiconductor chip is mounted;

a sealing portion for sealing said semiconductor chip;

a plurality of leads, each portion of which is exposed to an end portion of a rear surface of said sealing portion;

a hanging lead connected to said tab and exposed partially to the rear surface of said sealing portion; and

a plurality of conductive wires for connecting surface electrodes of said semiconductor chip and said leads corresponding thereto; and

a conductive wire for connecting a surface electrode for GND of said semiconductor chip and said hanging lead, the method comprising the step of:

testing said semiconductor device with a GND potential being supplied to a desired circuit of said semiconductor chip through a lead for GND among said plurality of leads and said hanging lead.

ABSTRACT

There are constituted by a tab (1b) on which a semiconductor chip (2) is mounted, a sealing portion (3) formed by resin-sealing the semiconductor chip (2), a plurality of leads (1a) each having a mounted surface (1d) exposed to a peripheral portion of a rear surface (3a) of the sealing portion (3) and a sealing-portion forming surface (1g) disposed on an opposite side thereto, and a wire (4) for connecting a pad (2a) of the semiconductor chip (2) and a lead (1a), wherein the length (M) between inner ends (1h) of the sealing-portion forming surfaces (1g) of the leads (1a) disposed so as to oppose to each other is formed to be larger than the length (L) between inner ends (1h) of the mounted surfaces (1d). Thereby, a chip mounting region surrounded by the inner end (1h) of the sealing-portion forming surface (1g) of each lead (1a) can be expanded and the size of the mountable chip is increased.